

Atlantic Richfield Company

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Anthony R. Brown
Project Manager, Mining

April 19, 2017

Lynda Deschambault
Remedial Project Manager, Superfund Division
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street, 10th Floor (SFD 7-1)
San Francisco, California 94105

Subject: Supplemental 2017 Monitoring for Groundwater/Surface Water Interaction Investigation near Acidic Pond and Leviathan Creek
Leviathan Mine Site
Alpine County, California

Dear Ms. Deschambault:

Atlantic Richfield Company (Atlantic Richfield) has prepared this letter to propose supplemental monitoring activities for the 2017 field season associated with the implementation of the On-Property Focused Remedial Investigation (FRI) Work Plan Amendment No. 11 - Task Sampling and Analysis Plan for Surface Water/Groundwater Interaction Investigation near Acidic Pond and Leviathan Creek¹ (Amendment No. 11) at Leviathan Mine Site (site) in Alpine County, California. Amendment No. 11 is being implemented in partial fulfillment of the requirements of the U.S. Environmental Protection Agency Region 9 (U.S. EPA) Statement of Work attached to the Administrative Order for Remedial Investigation and Feasibility Study (Unilateral Administrative Order), Comprehensive Environmental Response, Compensation, and Liability Act Docket No. 2008-18 issued on June 23, 2008.

The final Amendment No. 11 TSAP was submitted on May 6, 2016 and approved by U.S. EPA on June 14, 2016. Atlantic Richfield completed the scope of work outlined in the Amendment No. 11 TSAP during the 2016 field season. A total of 36 drive-point piezometers (DPZs) were installed along Leviathan Creek, with a higher density of DPZs installed at the acidic pond and at the marsh area near the confluence of Leviathan and Aspen creeks. All locations are shown on Figure 1. A generalized DPZ construction diagram is provided in Figure 2, and DPZ construction details are described on Table 1. The fully validated laboratory results for groundwater samples collected from the DPZs are not yet available; consequently, we have not yet completed our evaluation of groundwater/surface water interactions related to the Amendment No. 11 investigation. In addition, Atlantic Richfield anticipates that hydrologic conditions along lower Leviathan Creek during the 2017 field season may be different than those observed during the 2016 field season for the following reasons:

- ☐ The amount of precipitation recorded to date in the winter months of 2016-17 indicates that spring runoff will be above average. Hydrologic and hydraulic data

¹ Atlantic Richfield, 2016, On-Property Focused Remedial Investigation Work Plan Amendment No. 11 – Task Sampling and Analysis Plan for Surface Water/Groundwater Interaction Investigation Near Acidic Pond and Leviathan Creek, Leviathan Mine Site, Alpine County, California. Prepared by Amec Foster Wheeler Environment & Infrastructure, Inc., May 6.

collected during a very wet year may reveal different patterns (e.g. temporal reversals in gradient direction), than those collected during 2016, which was a year of average precipitation.

- ☐ Atlantic Richfield has proposed partially or completely removing Beaver Dams 3, 4, and 5 during the 2017 field season as described in the Draft Focused Feasibility Study Work Plan Evaluation of Remedial Technologies for Leviathan Creek Beaver Dam/Pond Complex² (BD/PC FFS Work Plan). The resulting lower surface water elevations will likely affect groundwater/surface water interactions at the drained ponds.

ADDITIONAL MONITORING PROPOSED FOR 2017

In light of these considerations, additional monitoring activities are proposed during the 2017 field season to serve the following objectives:

- ☐ Provide additional data to aid in our understanding of groundwater/surface water interactions in lower Leviathan Creek under above normal precipitation and runoff conditions;
- ☐ Evaluate changes in groundwater conditions and associated groundwater/surface water interactions in the vicinity of Beaver Ponds 3, 4, and 5 during and after the implementation of the BD/PC FFS Work Plan; and
- ☐ Provide additional data under post spring runoff conditions to aid in our evaluation of groundwater/surface water interactions in lower Leviathan Creek, including the marsh area near the confluence of Leviathan and Aspen creeks and in the vicinity of Delta Seep.

Based on the rationale summarized above, Atlantic Richfield recommends the following Amendment No. 11 scope of work for the 2017 field season, which is also summarized in Table 2, Table 3, and Figure 1. In addition, surface water sampling and streamflow measurements will be collected as part of the surface water program as described in a separate letter (dated April 7, 2017³) proposing the 2017 surface water program.

- ☐ Continued monitoring of water levels using the pressure transducers installed at select locations in 2016 (Tables 2 and 3);
- ☐ Manual measurements of groundwater levels approximately monthly at all DPZs (Table 2);
- ☐ Manual measurements of surface water levels approximately monthly adjacent to all DPZs (Table 2), using the DPZ top of casing as the reference point;

² Atlantic Richfield, 2017, Draft Focused Feasibility Study Work Plan Evaluation of Remedial Technologies for Leviathan Creek Beaver Dam/Pond Complex, Leviathan Mine Site, Alpine County, California. Prepared by Amec Foster Wheeler Environment & Infrastructure, Inc., March 21.

³ Atlantic Richfield, 2017, Implementation of 2017 Surface Water Monitoring Program, Leviathan Mine Site, Alpine County, California, April 7.

- ☐ Manual measurements of streamflow in the vicinity of the marsh area (SW-15, SW-24, SW-66 and SW-67) approximately monthly (Table 3); and
- ☐ Select drive point piezometers will be sampled prior to and after dam removal activities in the beaver ponds. Sampling locations were selected based on proximity to Beaver Ponds 3, 4, and 5 and include DPZ-09, DPZ-10, DPZ-13, DPZ-14, DPZ-23, DPZ-24, DPZ-25, DPZ-26, DPZ-35, DPZ-36, SW-14, SW-68, and SD-25 (Tables 2 and 3). Samples will be analyzed for the same field parameters and laboratory analytes as the previously approved Amendment No. 11 TSAP.
- ☐ Exact locations scheduled for laboratory or field parameter analyses are subject to change based on actual field conditions encountered during the implementation of the BD/PC FFS Work Plan.

REPORTING

Data collected during the implementation of the previously approved Amendment No. 11 TSAP during the 2016 season will be evaluated and incorporated into the Site Characterization Report planned for submittal by the end of 2017. Data collected during the 2017 field season will be presented in a subsequent appendix or supplement to the Site Characterization and/or the Draft RI Report.

ACCESS CONSIDERATIONS

Surface water flows during the spring are anticipated to be the highest observed since Amendment No. 11 monitoring has been implemented. As a result, Atlantic Richfield will attempt to implement the proposed activities at the identified locations, but certain locations may be inaccessible due to high flow conditions. If conditions are encountered where a location cannot be safely accessed, the conditions preventing access will be documented.

CLOSING

Atlantic Richfield respectfully requests expedited approval of the proposed field activities. Based on current long range forecast, field activities would begin in approximately May 2017.

If you have any questions or comments, please feel free to contact me at (657) 529-4537 or anthony.brown@bp.com.

Sincerely,



Anthony R. Brown
Project Manager, Mining

Attachment: Table 1 – Drive Point Piezometer Preliminary Construction Details
Table 2 – Summary of Proposed 2017 Drive-Point Piezometer Monitoring
Table 3 – Summary of Proposed 2017 Amendment 11 Surface Water Monitoring

Figure 1 – Amendment No. 11 Investigation Locations
Figure 2 – Generalized Drive-Point Piezometer Construction Diagram

cc: Gary Riley, U.S. Environmental Protection Agency, Region 9 – via electronic copy
John Hillenbrand, U.S. Environmental Protection Agency, Region 9 – via electronic copy
Douglas Carey, Lahontan Regional Water Quality Control Board – via electronic copy
Nathan Block, Esq., BP – via electronic copy
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Sandy Riese, EnSci, Inc. – via electronic copy
Marc Lombardi, Amec Foster Wheeler – via electronic copy
Grant Ohland, Ohland HydroGeo, LLC – via electronic copy
Dave McCarthy, Copper Environmental Consulting – via electronic copy
Cory Koger, U.S. Army Corps of Engineers – via electronic copy
Greg Reller, Burleson Consulting – via electronic copy
Ken Maas, U.S. Forest Service, Humboldt-Toiyabe National Forest – via electronic and
hard copy
Michelle Hochrein, Washoe Tribe of California and Nevada – via electronic and hard
copy
Fred Kirschner, AESE, Inc. – via electronic and hard copy

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LevCrk\170419 2017 Monitoring\170419 Plan.docx

TABLES

TABLE 1
DRIVE-POINT PIEZOMETER PRELIMINARY CONSTRUCTION DETAILS
 Leviathan Mine Site
 Alpine County, California

Location ID ¹	Installation Date	Northing ^{2,3} (ft)	Easting ^{2,3} (ft)	Top of Casing Elevation ^{3,4} (fmsl)	Casing Bottom Depth ³ (ft BTOC)	Casing Top Depth ³ (ft ags)	Total Depth ³ (ft BTOC)	Depth to Top of Screen ³ (ft BTOC)	Depth to Bottom of Screen ³ (ft BTOC)
DPZ-07	4/21/2016	2030995.79	7228926.85	6659.45	9.65	2.75	6.9	9.25	9.55
DPZ-08	4/21/2016	2030996.05	7228927.60	6659.75	12.65	3.25	9.4	12.25	12.55
DPZ-09	4/20/2016	2030981.10	7229038.99	6660.35	9.65	3.83	5.82	9.25	9.55
DPZ-10	4/20/2016	2030980.59	7229038.47	6660.50	12.65	4.08	8.57	12.25	12.55
DPZ-11	4/20/2016	2031033.68	7228987.18	6659.64	6.65	3.00	3.65	6.25	6.55
DPZ-12	4/20/2016	2031033.34	7228986.67	6659.91	12.65	3.31	9.34	12.25	12.55
DPZ-13	4/20/2016	2031043.97	7228919.97	6659.58	9.65	3.56	6.09	9.25	9.55
DPZ-14	4/20/2016	2031044.36	7228920.67	6659.66	12.65	3.92	8.73	12.25	12.55
DPZ-15	4/20/2016	2031058.46	7229093.30	6677.43	30.65	2.25	28.40	30.25	30.55
DPZ-16	4/20/2016	2030974.94	7228853.36	6662.71	12.65	4.08	8.57	12.25	12.55
DPZ-17	4/19/2016	2031602.76	7229425.90	6621.99	3.65	1.00	2.65	3.25	3.55
DPZ-18	4/19/2016	2031602.42	7229425.60	6623.59	9.65	2.67	6.98	9.25	9.55
DPZ-19	4/19/2016	2031908.35	7229361.76	6604.23	3.65	1.10	2.55	3.25	3.55
DPZ-20	4/19/2016	2031908.24	7229362.08	6605.65	9.65	2.50	7.15	9.25	9.55
DPZ-21	4/19/2016	2031590.11	7229239.95	6614.86	3.65	1.00	2.65	3.25	3.55
DPZ-22	4/19/2016	2031590.42	7229239.60	6616.05	9.65	2.33	7.32	9.25	9.55
DPZ-23	4/20/2016	2031198.59	7228967.88	6656.50	9.65	2.33	7.32	9.25	9.55
DPZ-24	4/20/2016	2031199.25	7228968.09	6656.68	15.65	2.58	13.07	15.25	15.55
DPZ-25	4/21/2016	2030905.86	7228891.74	6662.64	6.65	3.79	2.86	6.25	6.55
DPZ-26	4/21/2016	2030906.45	7228892.43	6663.06	9.65	3.83	5.82	9.25	9.55
DPZ-27	4/21/2016	2030479.93	7229026.60	6679.83	6.65	3.71	2.94	6.25	6.55
DPZ-28	4/21/2016	2030480.47	7229026.54	6680.36	9.65	4.40	5.25	9.25	9.55
DPZ-29	4/21/2016	2030021.61	7228977.07	6699.19	6.65	3.58	3.07	6.25	6.55
DPZ-30	4/21/2016	2030021.58	7228977.68	6699.78	9.65	4.33	5.32	9.25	9.55
DPZ-31	4/19/2016	2029491.80	7228560.10	6738.20	6.65	3.42	3.23	6.25	6.55
DPZ-32	4/19/2016	2029492.34	7228562.28	6737.57	9.65	3.42	6.23	9.25	9.55
DPZ-34	4/21/2016	2028492.98	7228529.24	6802.42	9.65	2.50	7.15	9.25	9.55
DPZ-35	4/19/2016	2031203.97	7228927.52	6659.04	6.65	4.00	2.65	6.25	6.55
DPZ-36	4/19/2016	2031204.62	7228927.95	6659.09	9.65	4.00	5.65	9.25	9.55
DPZ-37	4/19/2016	2030468.20	7228998.47	6681.09	6.65	4.42	2.23	6.25	6.55
DPZ-38	4/19/2016	2030468.46	7228998.10	6681.28	12.65	5.17	7.48	12.25	12.55
DPZ-39	4/19/2016	2029498.79	7228560.90	6737.26	6.65	2.75	3.90	6.25	6.55
DPZ-40	4/19/2016	2029503.68	7228558.77	6737.77	9.65	3.42	6.233	9.25	9.55
DPZ-42	4/21/2016	2028485.62	7228503.11	6802.96	9.65	1.83	7.82	9.25	9.55
DPZ-43	4/21/2016	2028275.45	7228565.86	6818.33	9.65	2.33	7.32	9.25	9.55
DPZ-44	4/21/2016	2028274.66	7228565.98	6818.39	12.65	2.25	10.40	12.25	12.55

Notes

- Locations shown on Figure 1.
- Horizontal coordinates were surveyed by Summit Engineering and reference NAD83, California Zone 2.
- All data are preliminary.
- Elevations were surveyed by Summit Engineering and reference NGVD29.

Abbreviations

ags = above ground surface
 BTOC = below top of casing
 ft = feet
 fmsl = feet above mean sea level
 ID = identification
 NAD83 = North American Datum of 1983
 NGVD29 = National Geodetic Vertical Datum of 1929



TABLE 2
SUMMARY OF PROPOSED 2017 DRIVE-POINT PIEZOMETER MONITORING
Leviathan Mine Site
Alpine County, California

Parameters			Dissolved Metals ²			Dissolved Mercury			Anions ⁴			oPO4		Alkalinity ⁵		Acidity		TDS		Cations ³		Hardness (CaCO ₃)		Field Parameters ¹		Hexavalent chromium		Ferrous Iron		NH ₃ (as N)		QC Samples ⁶									
																																Field Blanks	Field Duplicates	MS/MSD or LD ⁸							
Method			EPA 200.8			EPA 200.7			EPA 245.1			EPA 300.0			EPA 300.0/ EPA 365.3		SM 2320B		SM 2310B		SM 2540C		EPA 200.7		SM 2340B		SOP 6.0		EPA 218.6 ⁷		SOP 6.0		SM 4500 NH3		Same as Primary Sample			Manual measurements of groundwater and surface water levels		Continuous water-level measurements using pressure transducer/data logger	
Containers			1 x 250 mL HDPE			1 x 1 L HDPE									1 x 250 mL HDPE		1 x 100 mL HDPE		1 X 250 mL HDPE		1 x 250 mL HDPE		1 x 500 mL HDPE																		
Minimum Volume (mL)			50	50	150	30			50			125	125	125	50		25	50		25	500																				
Field Filtered ⁹			Yes			No															No		No		Yes		No														
Preservation ¹⁰			HNO ₃			None									HNO ₃		None		None		(NH ₄) ₂ SO ₄		None		H ₂ SO ₄																
Maximum Holding Time ¹¹			28d			48hr			48hr	14d	14d	7d	28d	28d	ASAP	24hr	28d	ASAP	28d																						
Laboratory			ALS															NA		TestAmerica		NA		ALS																	
Study Area	Feature	Sampling Locations ¹²																																							
LCSA	Acidic Pond	DPZ-07																															X	X							
LCSA		DPZ-08																															X	X							
LCSA		DPZ-09	X	X	X		X		X	X	X	X	X	X	X	X	X	X		X		X		X									X								
LCSA		DPZ-10	X	X	X		X		X	X	X	X	X	X	X	X	X	X		X		X		X									X								
LCSA		DPZ-11																															X	X							
LCSA		DPZ-12																															X								
LCSA		DPZ-13	X	X	X		X		X	X	X	X	X	X	X	X	X	X		X		X		X									X								
LCSA		DPZ-14	X	X	X		X		X	X	X	X	X	X	X	X	X	X		X		X		X									X								
LCSA		DPZ-15																															X								
LCSA		DPZ-16																															X	X							
LCSA	Confluence of Leviathan and Aspen Creeks	DPZ-17																															X								
LCSA		DPZ-18																															X								
ACSA		DPZ-19																															X								
ACSA		DPZ-20																															X	X							
LCSA		DPZ-21																															X								
LCSA		DPZ-22																															X								
LCSA	Leviathan Creek from Delta Seep downstream to the confluence of Leviathan and Aspen Creeks	DPZ-23	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X									X									
LCSA		DPZ-24	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X									X									
LCSA		DPZ-25	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X									X	X								
LCSA		DPZ-26	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X									X	X								
LCSA		DPZ-27																															X	X							
LCSA		DPZ-28																															X	X							
LCSA		DPZ-29																															X								
LCSA		DPZ-30																															X								
LCSA		DPZ-31																															X								
LCSA		DPZ-32																															X								
LCSA		DPZ-33																															X								
LCSA		DPZ-35	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X										X								
LCSA		DPZ-36	X	X	X		X		X	X	X	X	X	X	X	X	X		X		X		X										X								
LCSA		DPZ-37																															X								
LCSA		DPZ-38																															X								
LCSA		DPZ-39																															X								
LCSA		DPZ-40																															X								
LCSA		DPZ-42																															X								
LCSA		DPZ-43																															X								
LCSA		DPZ-44																															X								
Total Samples per Event			10	10	10	10			10			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	2	2	1	36	9									

Notes

1. Field parameters include temperature, specific electrical conductance, pH, dissolved oxygen, and oxidation-reduction potential.
2. Metals include: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, selenium, thallium, vanadium, and zinc.
3. Cations include: calcium, potassium, sodium, and magnesium.
4. Anions include: chloride, sulfate, and nitrate-N.
5. Alkalinity includes: total, bicarbonate, carbonate and hydroxide components.
6. QC sample locations are dependent on actual samples collected and may need to be adjusted to meet the required 10% minimum (every 10 samples) for field blanks and field duplicates and the 5% minimum (every 20 samples) for MS/MSD or LD.
7. Samples for hexavalent chromium may be preserved with $(\text{NH}_4)_2\text{SO}_4$ when sample pH > 6 (minimize buffering) to extend the maximum holding time from 24 hours to 28 days.
8. LD analyzed in lieu of MS/MSD where "spiking" is not amenable to the test method.
9. Filter samples using a 0.45 micron high capacity filter.
10. Samples should be stored at a temperature ranging from 0°C - 6°C.
11. Represents the shortest recommended holding time where multiple target analytes are listed.
12. Approximate sampling locations shown on Figure 1. Locations scheduled for laboratory or field parameter analyses are subject to change based on actual field activities conducted under the March 21, 2017 BD/PC FFS Work Plan.

Sample ID

Groundwater samples:	GWLMDDYYXX	Use for all samples collected in the Leviathan Creek Study Area, consecutively, for a given date.
	GWAMDDYYXX	Use for all samples collected in the Aspen Creek Study Area, consecutively, for a given date.

Abbreviations

°C = degrees Celsius
 ACSA = Aspen Creek Study Area
 ALS = ALS Environmental
 ASAP = as soon as possible
 CaCO₃ = calcium carbonate
 d = days
 DOC = dissolved organic carbon
 EPA = Environmental Protection Agency
 H₂SO₄ = sulfuric acid
 HCl = hydrochloric acid
 HDPE = high density polyethylene
 HNO₃ = nitric acid
 hr = hours
 ID = identification
 L = liter
 LCSA = Leviathan Creek Study Area
 LD = laboratory duplicate
 mL = milliliter
 MS/MSD = matrix spike / matrix spike duplicate
 N = nitrogen
 (NH₄)₂SO₄ = ammonium sulfate
 NH₃ = ammonia
 oPO4 = ortho-phosphate-P
 QC = quality control
 SM = Standard Methods for Water and Wastewater
 SOP = standard operating procedure
 su = standard units
 TDS = total dissolved solids

TABLE 3
SUMMARY OF PROPOSED 2017 AMENDMENT 11 SURFACE WATER MONITORING
Leviathan Mine Site
Alpine County, California

Parameters			Field Parameters ¹		Ferrous Iron	Hexavalent chromium	Dissolved Metals ²	Total Metals ²	Cations ³	Hardness (CaCO ₃)	DOC	NH ₃ (as N)	Anions ⁴	Alkalinity ⁵	Acidity	TDS	QC Samples ⁶			Monthly surface water flow measurements	Continuous water level monitoring using pressure transducer/data logger
Method			SOP 6.0		EPA 218.6 ⁷	EPA 200.7/ EPA 200.8/ EPA 245.1	EPA 200.7/ EPA 200.8/ EPA 245.1	EPA 200.7	SM 2340B	SM 5310B	SM 4500 NH3	EPA 300.0/ EPA 365.3	SM 2320B	SM 2310B	SM 2540C	Field Blanks	Field Duplicates	MS/MSD or LD ⁸			
Containers			1 x 100 mL HDPE	1 x 250 mL HDPE	1 X 250 mL HDPE	1 x 250 mL HDPE	1 x 250 mL HDPE	1x250 mL glass	1 x 500 mL HDPE	1 x 1 L HDPE	Same as Primary Sample	Same as Primary Sample									
Minimum Volume			25 mL	25 mL	250 mL	250 mL	250 mL	125 mL	500 mL	1 L											
Field Filtered ⁹			No	Yes	Yes	Yes	No	Yes	No	No											
Preservation ¹⁰			None		None	(NH ₄) ₂ SO ₄	HNO ₃	HNO ₃	H ₂ SO ₄ or HCl	H ₂ SO ₄			None								
Maximum Holding Time ¹¹			ASAP		24 hr	28 d	28 d	28 d	28 d	28 d			48 hr	14 d	7 d						
Laboratory			NA		TestAmerica		ALS														
Study Area	Feature	Sampling Locations ¹²																			
LCSA	Acidic Pond	SW-68	X	X	X	X	X	X	X	X	X	X	X	X	X		X			X	
	Leviathan Creek from Delta Seep to downstream of the confluence of Leviathan and Aspen Creeks	SD-25	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	
		SD-31																		X	
		SW-14	X	X	X	X	X	X	X	X	X	X	X	X	X			X			
		SW-15																		X	
		SW-66																		X	
DSA		SW-67																	X		
ACSA	Aspen Creek	SW-24																	X		
Total Samples per Event			3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1	4	3	

- Notes
1. Field parameters include temperature, specific electrical conductance, pH, dissolved oxygen, and oxidation-reduction potential.
2. Metals include: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, selenium, thallium, vanadium, and zinc.
3. Cations include: calcium, potassium, sodium, and magnesium.
4. Anions include: chloride, sulfate, nitrate-N, and ortho-phosphate-P.
5. Alkalinity includes: total, bicarbonate, carbonate and hydroxide components.
6. QC sample locations are dependent on actual samples collected and may need to be adjusted to meet the required 10% minimum (every 10 samples) for field blanks and field duplicates and the 5% minimum (every 20 samples) for MS/MSD or LD.
7. Samples for hexavalent chromium may be preserved with (NH₄)₂SO₄ when sample pH> 6 (minimize buffering) to extend the maximum holding time from 24 hours to 28 days.
8. LD analyzed in lieu of MS/MSD where "spiking" is not amenable to the test method.
9. Filter samples using a 0.45 micron high capacity filter.
10. Samples should be stored at a temperature ranging from 0°C - 6°C.
11. Represents the shortest recommended holding time where multiple target analytes are listed.
12. Approximate sampling locations shown on Figure 1. Locations scheduled for laboratory or field parameter analyses are subject to change based on actual field activities conducted under the March 21, 2017 BD/PC FFS Work Plan.

Sample ID

Surface water samples: SWLMDDYYXX Use for all samples collected in the Leviathan Creek Study Area, consecutively, for a given date.

SWAMMDDYYXX Use for all samples collected in the Aspen Creek Study Area, consecutively, for a given date.

Abbreviations

°C = degrees Celsius

ACSA = Aspen Creek Study Area

ALS = ALS Environmental

ASAP = as soon as possible

CaCO₃ = calcium carbonate

d = days

DOC = dissolved organic carbon

EPA = Environmental Protection Agency

H₂SO₄ = sulfuric acid

HCl = hydrochloric acid

HDPE = high density polyethylene

HNO₃ = nitric acid

hr = hours

ID = identification

L = liter

LCSA = Leviathan Creek Study Area

LD = laboratory duplicate

mL = milliliter

MS/MSD = matrix spike / matrix spike duplicate

N = nitrogen

(NH₄)₂SO₄ = ammonium sulfate

NH₃ = ammonia

QC = quality control

SM = Standard Methods for Water and Wastewater

SOP = standard operating procedure

su = standard units

TDS = total dissolved solids

FIGURES



Explanation

- Beaver Dam Locations
- Leviathan Creek Basin Landslide
- Transects for Amendment 10
- Proposed Surface Water Station
- Surface Water Monitoring Stations
- Proposed Drive-Point Piezometers
- Proposed Seepage Meter
- Existing Monitoring Well Locations
- Proposed Surface Water Gauge

Soil Type

- Acidic Pond
- coarse-loamy
- coarse-loamy, shallow water table
- fine
- fine, shallow water table
- fine-loamy

Floodplain Age Category

- 1
- 2
- 3

0 500 Feet

AMENDMENT NO. 11

INVESTIGATION LOCATIONS

Leviathan Mine Site

Alpine County, California

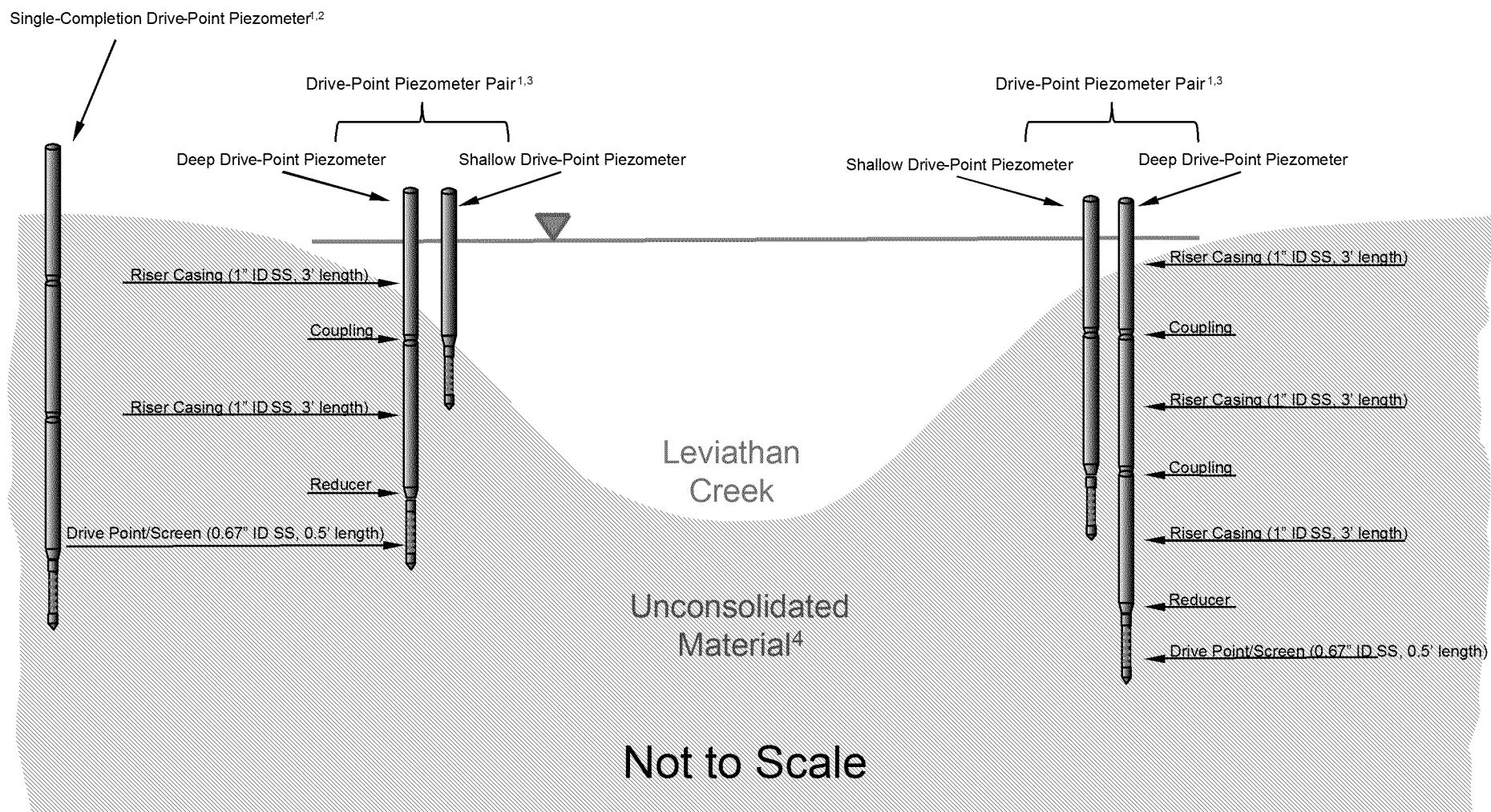
By: DMC

Date: 03/29/2017

Project No. 0013091

Figure

1



Notes:

- 1) Locations of drive-point piezometers are provided on Figure 1. Spatial coordinates and construction details are provided on Table 1.
- 2) Four single-completion drive-point piezometers were installed.
- 3) Sixteen nested (one deep and one shallow) drive-point piezometer pairs were installed. When possible, drive-point piezometer pairs were installed directly in surface water.
- 4) Logging of materials is not possible during drive-point piezometer installation because no soil cuttings are generated.

GENERALIZED DRIVE-POINT
PIEZOMETER CONSTRUCTION
DIAGRAM

Leviathan Mine Site
Alpine County, California



Date: 04/17/2017

By: ALB

Project No. 0013091

**Figure
2**